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July 10, 2001

**VIA FEDERAL EXPRESS**

Airbill No. 8290 4934 1960

Donald Evans, Secretary  
Department of Commerce  
Herbert C. Hoover Building  
14<sup>th</sup> Street and Constitution Avenue, N.W.  
Washington, D.C. 20230

rec'd 6:05  
JUL 12 2001  
[Signature]

Re: Barnes Nursery, Inc.

Dear Mr. Secretary:

Enclosed is a copy of Barnes Nursery, Inc.'s Notice of Appeal with attachments. We have also enclosed our check in the amount of \$200.00 for the application fee.

If you have any questions, please feel free to contact me.

Very truly yours,

[Signature]

Steven D. Bell

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Enclosures

cc: Samuel W. Speck, ODNR  
Assistant General Counsel for Ocean Services

UNITED STATES DEPARTMENT OF COMMERCE  
OFFICE OF THE SECRETARY

In Re: Barnes Nursery, Inc.

Appellant

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)  
)

NOTICE OF APPEAL

Barnes Nursery, Inc. hereby gives notice of its appeal to the Secretary from the decision of the Ohio Department of Natural Resources which is attached hereto at Tab A. The decision of the Ohio Department of Natural Resources was received by Barnes Nursery, Inc. on June 13, 2001.

The grounds for the appeal of Barnes Nursery, Inc. can be found in the materials attached hereto at Tab B. The materials at Tab B are incorporated as if fully rewritten herein.



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Attorney for Barnes Nursery, Inc.

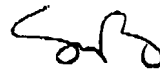
**CERTIFICATE OF SERVICE**

A copy of the foregoing Notice of Appeal has been served by regular U.S. mail on this 10<sup>th</sup> day of July, 2001, upon the following:

Donald Evans, Secretary (via overnight mail)  
Department of Commerce  
Herbert C. Hoover Building  
14<sup>th</sup> Street and Constitution Avenue, N.W.  
Washington, D.C. 20230

Samuel W. Speck, Director  
Ohio Department of Natural Resources  
1952 Belcher Drive - Building C-4  
Columbus, OH 43224-1386

Assistant General Counsel for Ocean Services (GCOS)  
1305 East West Highway, Room 6111  
SSMC 4  
Silver Spring, MD 20910



\_\_\_\_\_  
Steven D. Bell

**TAB "A"**



# Ohio Department of Natural Resources

BOB TAFT, GOVERNOR

SAMUEL W. SPECK, DIRECTOR

June , 2001

Mr. Robert Barnes  
Barnes Nursery, Inc.  
3511 Cleveland Road West  
Huron, OH 44839

Dear Mr. Barnes:

ODNR has completed its formal consistency review of your proposed project (Corps public notice number 2000-02170(1)). Your proposed project area is located in the designated Coastal Area of Lake Erie. The Ohio Coastal Management Program (OCMP), approved by the U.S. Department of Commerce (National Oceanic and Atmospheric Administration), requires that any project that is situated in the Coastal Area be consistent with the policies of the OCMP. Pursuant to 16 U.S.C. 1456 (c) (3); 15 C.F.R. 930.64(b), Ohio objects to the consistency certification for this project based on enforceable policies.

As quoted from the Corps' Public Notice, "The stated project purpose is to: restore the former hydrologic circulation to a portion of East Sandusky Bay and provide irrigation water for the operation of Mr. Barnes' nursery; establish new avifauna habitat on a series of islands; provide deep water fish and aquatic vegetation habitat; and promote the conversion of about five acres of barren mudflats to coastal wetlands. The applicant states these measures are necessary as a result of sedimentation and degradation to the area caused by human activities over the past century." You propose to dredge approximately 14,000 cubic yards of material.

You are requesting an after-the-fact permit to maintain the project constructed during July 2000. This consists of a channel, about 1,500 feet long, 50 feet wide, and 5 feet deep, constructed using dredging techniques, and an earthen berm, about 1,500 feet long and 55 feet wide, constructed by sidecasting the dredge material, and runs parallel with the channel.

You additionally request authorization to construct the following modifications

1. Restore about 200 feet of the channel to former topography where wetland encroachment occurred.
2. Grade the earthen berm to a relatively uniform elevation of about 6 feet high.
3. Divide the earthen berm into five separate islands by cutting circulation channels about every 300 feet, which will result in seven water passages through the islands.
4. Grade the banks of the islands to a 4 to 1 slope (run to rise) to foster wetland plant zonation.
5. Excavate a narrow feeder channel, 500 feet long and 1.5 feet deep by dragging a steel plow connected by cable to a winch temporarily mounted on the western end of the earthen berm.

Modification No. 1 was completed on April 18, 2001 as an interim corrective measure aimed at restoring the functions and values of all wetlands impacted by the construction of this project. ODNR poses the following questions that you (or your consultant) should answer:

The position of the canal shown on the location map differs from that visible in the applicant's figure 5 and on oblique aerial photographs taken by ODNR staff in 2000. Please see figures A, B, and C of the attached graphics.

The application indicates that the elevation of the mudflat is approximately 570.8 (IGLD 85). If the feeder channel is 1.5 feet deep as stated in the application, then the bottom elevation will

be 569.3 feet (IGLD 85). However, the bottom elevation of the proposed feeder channel is described as 568.8 feet (IGLD 85). Which is correct?

The application implies that the term "avulsion" is used on page 3 in Carter (1973b). Carter does not use that term. Barrier beaches typically recede in response to washover events. At lower lake levels, higher intensity storms are necessary to generate the storm surges and storm waves necessary to overtop a barrier beach. At higher lake levels, like those between the early 1970s and the mid 1990s, even lower intensity storms generate storm surges and storm waves sufficient to overtop the barrier.

The application shows bathymetric profiles that extend "100 m" (300 feet) offshore, but calculates cross-sectional areas in square feet to "300 m" offshore. You then multiply the average change in cross-sectional area (290 sq ft) by length of the beach (800 ft) to calculate the volume of sand eroded during a storm. The volume of sediment lost from the nearshore is 232,000 cu ft, not 23,300 cu ft ( $290 \text{ sq ft} \times 800 \text{ ft} = 232,000 \text{ cu ft}$ ).

According to the 1901 map included as figure 1 in the application, Sawmill Creek did flow into the eastern part of Sandusky Bay. However, the pool into which Sawmill Creek flowed is not shown connected to the rest of Sandusky Bay. The property where Barnes Nursery is now located lies to the west of this pool and may not have received water from Sawmill Creek at the 1901 lake level.

ODNR provides the following historical perspective based on our review of available data:

Recession line maps show the barrier at Sheldon Marsh has retreated approximately 850 feet since 1972. As a result, the old Black Channel probably is buried beneath or lays lakeward of the barrier beach.

- Even if the Black Channel remained open, parts of Sheldon Marsh and adjacent areas will be sub aerially exposed whenever the lake's elevation is below ground elevation. Creating a deep-water channel will not flood areas that are above prevailing lake level.

A deep, abandoned channel running along the landward side of the barrier at Sheldon Marsh could have contributed to rapid recession of the barrier. If sand transported across the barrier by storm waves cascaded into a deep channel rather than onto a relatively flat bay bottom, sand needed to maintain the barrier's elevation above lake level would have been deposited down in the channel. Until the channel was filled with sand, the barrier would have been narrower and lower and would likely have receded more quickly.

In July 1986, the Ohio Geological Survey ran bathymetric profiles across the wetland at Sheldon Marsh SNP. Data were collected with a recording fathometer operated in small boat. Profiles were spaced at 1100- to 1400-foot intervals along the barrier and ran 800- to 2150-feet landward to where water depths less than three feet impaired navigation. Lake level at the time of the surveys was 574.3 feet (IGLD 85). Maximum water depth occurred just landward of the barrier and did not exceed 4.3 feet. Analysis of the fathograms found no bathymetric evidence and no sedimentologic evidence of a deep, abandoned channel running east west through Sheldon Marsh. The fathograms show the bay bottom rises very gently and uniformly landward along each profile, except along the profile that intersected shore a short distance east of the canal at Barnes Nursery. Along the latter profile, the bay bottom leveled out about 600 feet from the shoreward end of the profile, increased abruptly in elevation about 350 feet from the end of the profile, declined 0.5 feet in elevation from this point to about 200 feet from the end of the profile and then rose rapidly shoreward. Elevation at the bottom of the depression was about 570.7 feet (IGLD, 1985).

The 1901 topographic map was prepared at a time when annual lake level was 570.1 ft (IGLD 85) following an eight-year period during which annual lake level reached its lowest point (569.8 ft IGLD 85) in 30 years. The annual level in 1901 was about one foot lower than the annual level for 2000 (570.9 ft, IGLD 85) and to the summer level projected for 2001 (571.2 ft, IGLD 85). If the 1901 topographic map is accurate, then circulation in Sheldon Marsh has historically been restricted at lower lake levels.

- Aerial photographs provided by the applicant show a natural channel system extending eastward into Sheldon Marsh from the canal along Willow Drive. This channel system appears to be in the same general location as a channel system visible on 1937 aerial photographs (figure D). In 1937, water flowing in or out of the channel system must have passed through or under Willow Drive, restricting exchange of water. Breaching of the barrier beach at Sheldon Marsh SNP in 1972 has allowed more rapid exchange of water around the northwest end of the barrier, down along the east side of Willow Drive, and into the channel system.
- Aerial photographs taken in 1968 show hydrologic conditions when lake level was 571.4 ft (IGLD, 1985) or about  $\leq 0.5$  ft higher than present levels (see figure E). In 1968, a narrow drainage way extended northward from Barnes Nursery and connected with deeper water in Sheldon Marsh. The applicant has now dredged a portion of this drainage way. Note also that the mudflat area supported a variety of vegetation.

Projection of USGS topographic contours onto a 1997 aerial photograph (Figure A) shows that there are no east west channels in the area of the recently excavated channel. In addition, it does not appear that the barrier has receded far enough southward to completely obstruct flow to Barnes Nursery.

The mudflat area was covered with wetland vegetation during low water conditions in 1968 and in 1937. Given time, the mudflat may become colonized by wetland vegetation presently growing south of the canal.

In spite of the changes which have occurred in the area encompassing Sheldon Marsh State Nature Preserve, the fact remains that Sheldon Marsh represents one of the last and probably best example in Ohio of a naturally functioning Lake Erie wetland and barrier beach system. These natural wetlands have always been free to migrate with the rise and fall of the Lake Erie water levels. The majority of wetlands along Lake Erie today are artificially maintained through a system of dikes and pumping stations to control the water levels in them. ODNR, through its Division of Natural Areas and Preserves (DNAP), seeks to protect and maintain the Sheldon Marsh complex in as natural a state as possible without wetland manipulation or designs of "improvement" to compensate for what some might view as negative changes in the system. ODNR is opposed to any manipulation of the Sheldon Marsh ecosystem that significantly alters the structure and character of this important complex. Additionally, small feeder channel construction to connect Lake Erie with the newly (already constructed) dredged channel would cross a dedicated nature preserve. This action is prohibited by natural areas and preserves law (O.R.C. 1517) and therefore not a possible option.

Pursuant to 16 U.S.C. 1456 (c) (3); 15 C.F.R. 930.64(b), Ohio objects to this project and finds that it is not consistent with the policies of the OCPM. This is based on the following enforceable policies:

- Policy 2 – Shore Erosion Control

It is the policy of the State of Ohio to promote sound decisions regarding control of shore erosion by: Issuing permits for construction of shoreline erosion control structures (O.R.C. 1507.04).

June 11, 2001

Page 4 of 8

*Discussion:*

The application for department of army permit included in the public notice indicates the proposed project is within a bay of Lake Erie [ref: page 1, line 13, "East Sandusky Bay of Sandusky Basin"] and that a portion of the project is intended to control erosion [ref: page 12, line 20, "The islands will serve several purposes: (1) provide erosion control from waves generated in East Sandusky Bay and Lake Erie...]. Based on the information provided in this Public Notice, the applicant must obtain a Shore Structure Permit pursuant to Section 1521.22 of the Ohio Revised Code prior to construction. You have not applied for this permit.

- Policy 6 – Water Quality

It is the policy of the State of Ohio to maintain and improve the quality of the state's coastal waters for the purpose of protecting the public health and welfare and to enable the use of such waters for public water supply, industrial and agricultural needs, and propagation of fish, aquatic life, and wildlife by: Assuring attainment of state water quality standards and other water quality related requirements (O.A.C. 3745-1) through regulating discharge of dredge or fill material into surface waters including wetlands in accordance with Section 401 of the Clean Water Act (O.R.C. 6111.03).

- Policy 12 – Wetlands

It is the policy of the State of Ohio to project, preserve and manage wetlands with the overall goal to retain the state's remaining wetlands, and where feasible, restore and create wetlands to increase the state's wetland resource base by: Regulating activities in wetlands through the enforcement of Ohio water quality standards for any activity that may result in any discharge into wetlands and other waters of the state (O.R.C. 6111.03(o), O.R.C. 6111.03(p), O.A.C. 3745-1-05, 3745-1-5- to 543 and 3745-32). The Ohio Environmental Protection Agency has indicated that the project area is a category 3 wetland. Category wetlands are those that support superior wetland functions.

- Policy 14 – Rare and endangered species

It is the policy of the State of Ohio to preserve and protect rare, threatened and endangered plant and animal species to prevent their possible extinction by: Restricting the taking or possession of native animal species, or their eggs or offspring, that are threatened with statewide extinction (O.R.C. 1531.25 and O.R.C. 1531.99); Protecting the waters that provide a habitat for rare and endangered species (O.R.C. 6111.03(O), O.R.C. 6111.03(R), O.A.C. 3745-1-05(C)).

- Policy 17 – Dredging and Dredged Material Disposal

It is the policy of the State of Ohio to provide for the dredging of harbors, river channel and other waterways and to protect the water quality, public right to navigation, recreation and natural resources associated with these waters in the disposal of the dredged material by: Regulating, through the Ohio Environmental Protection Agency water quality certification, the discharge or disposal of dredged material (O.R.C. 6111.03(P) AND O.A.C. 3745-1)

- Policy 27 – Fisheries Management

It is the policy of the State of Ohio to assure the continual enjoyment of the benefits received from the fisheries of Lake Erie and to maintain and improve these fisheries by: Regulating the taking of fish (O.R.C. 1531.08 and O.A.C. 1501.31); Protecting fish habitat through Ohio EPA's Section 401 water quality certification authority (O.R.C. 6111.03(O) AND 6111.03(P) and O.A.C. 3745-1 AND 3745-32).



June 11, 2001

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- Policy 29 – Wildlife Management

It is the policy of the State of Ohio to provide for the management of wildlife in the coastal area to assure the continued enjoyment of benefits received from wildlife by: Protecting all wildlife including nongame and endangered species (O.R.C. 1531.02, 1531.08 and 1531.25).

*Discussion:*

The project, proposed to be constructed in one of the few barrier beach/lagoon wetland complexes remaining in the State of Ohio, is immediately adjacent to the Sheldon Marsh State Nature Preserve. ODNR is concerned this project will adversely alter the hydrology of this important complex. Lake Erie water levels are this wetland's primary hydrological influence. The wetland is hydrologically unrestricted with no lakeward or upland border alterations and is categorized as a coastal marsh with unrestricted hydrology. This project has affected and will affect the hydrologic regime of this rare coastal wetland setting. Activities conducted by the applicant have already adversely affected Sheldon Marsh State Nature Preserve and adjacent wetlands. Until the site is restored, it is expected to continue to adversely affect the quality of highly important coastal wetlands, associated fish and wildlife resources, and beneficial functions of waters of the state important to the general public interest. This is due to the physical alteration of these category three wetlands, as defined in Ohio's wetland water quality standards, and the alteration of water flow and movement of aquatic organisms within these special habitat waters of Lake Erie (critical resource waters.) The plan will also result in hydrological alterations detrimental to Sheldon Marsh in terms of nutrient depletion, interference with water runoff feeding the marsh and negative effects upon plant community composition. This area also has an effect on our Lake Erie fish community. It is important to retain the few remaining natural coastal features that allow connectivity between the lake and the land.

As to the assertion that this channel would provide deep water habitat for fish, the Lake Erie wetlands would not have served this niche. These wetlands were important as spawning and nursery areas for many species, some of which are no longer present. As water levels dropped or during winter months those species that required deeper waters would have moved out into the lake or Sandusky Bay proper. The creation of deeper waters in the Sandusky wetlands without the presence of submersed aquatic vegetation (as was originally present) is of dubious value from a fisheries standpoint. The productivity of these wetlands from a fisheries standpoint is directly correlated to the diversity and abundance of aquatic vegetation found in them. The proposed water supply channel does not have a mechanism to maintain its channel. This channel will require regular maintenance, probably in the form of dredging, to maintain the desired depth and keep it from filling in. This will require some sort of access to the channel and a disposal site for dredge material.

High lake levels and wave action will erode the proposed islands during storm events (as have all the unarmored dikes that were built in the Lake Erie marshes in the 60's and 70's). To be stable, they would likely have to be armored with riprap as have all the other dikes on Lake Erie. This would certainly negate what little (if any value) they had as nesting habitat for birds. Their value as nesting habitat would be dubious at best. Using dredge spoil to create waterfowl nesting islands is of concern. Nesting waterfowl are dependent upon the presence of large expanses of high quality mixed emergent marsh vegetation that is not the type of ecosystem found at Sheldon Marsh for the most part. Assuming the islands could be kept free of Phragmites and purple loosestrife, which will be likely to quickly colonize, the Canada goose is the only species of waterfowl that would probably utilize these mounds. Autumnal lowering of the water levels around the bay creates mudflats that support a number of state-listed rare wetland plants that are annuals and low in stature. Grazing by geese is one of the definable

threats to these plants. DNAP staff has observed goose scat on the portion of the project already constructed.

Other desirable waterfowl species that occur in the Lake Erie marshes, such as blue-winged teal, American wigeon and redhead, will not be found nesting in the area because suitable marsh plant associations are not present. If the islands were created, they may well turn out to be good nesting habitat for herring and ring-billed gulls. These are not species that should be encouraged to nest in this area. Gulls are voracious predators of the eggs of other bird species, including piping plover and common tern. The nearby barrier beach, which is part of Sheldon Marsh State Nature Preserve, has been identified by the U.S. Fish and Wildlife Service as potential nesting habitat for the Federally Endangered piping plover and is one of the best breeding habitats for this species that exists along Lake Erie. The beach also provides excellent potential nesting habitat for the state endangered common tern, a species whose colonies are notorious for being decimated by gull predation. The proposed islands would provide little, if any, benefit to wildlife. While they may lead to a small amount of potential nesting habitat for birds, when revegetated, it is unlikely that any nesting attempts would be successful because of predation due to the islands being too close to the shore. These island areas would better serve wildlife if subject to inundation by water under normal lake level regimes.

This area, particularly with the recent low water levels of Lake Erie, is one of the best migratory stopover sites for numerous species of migrating shorebirds, including the federally and state endangered piping plover. So important is the Sheldon Marsh area to the piping plover, that the U.S. Fish and Wildlife Service designated this unique area as critical habitat. Very little suitable piping plover habitat remains in the region, thus, the Sheldon marsh area is essential for the recovery of the species. To permit any activity that has the strong potential to cause ecological changes that could be harmful to one of the best migrant shorebird staging areas on Lake Erie would be irresponsible. With the loss of shorebird habitat in recent years along the Lake Erie shoreline, Sheldon Marsh and the surrounding area has taken on an increasingly important role for migrant waders. It is likely that groups of migratory waders displaced from other areas along the Lake Erie shoreline are increasingly dependent upon Sheldon Marsh.

One major problem with this project is that it involves a proposed ditch that traverses wetlands that are contiguous with the Sheldon Marsh State Nature Preserve. This creates a convenient avenue of migration for invasive plants to enter an area that is currently free of any significant concentrations of problem species, such as Phragmites. It also would undoubtedly create future disturbances that would adversely impact the shallow bay between the ditch and Lake Erie, which is part of the nature preserve. The excavated channel will encourage invasion of unwanted exotic species into Sheldon Marsh such as Phragmites plants and perhaps increase numbers of undesirable fish. In addition, the dike as it currently sits, provides a colonization site for invasive plant species, which have the ability to out-compete native and more desirable species. Invasive species easily establish on disturbed soils, such as a spoil bank, and can spread over the entire marsh. Monotypic stands of Phragmites provide little value to the aquatic community and are extremely difficult to control. It is necessary to avoid this threat to Sheldon Marsh Nature Preserve. Successful efforts in controlling Phragmites on the dike in its current form may lead to colonization and nesting by double-crested cormorants, which may also have negative impacts on this wetland complex and its beneficial functions important to the public interest. Wetland species migrate landward and lakeward across the gently sloping lake plain as lake levels fluctuate. This natural process has successfully maintained the vitality of wetland flora and fauna along the south shore of Lake Erie for thousands of years.

Furthermore, approval of an individual permit is not consistent with the following Ohio Coastal Nonpoint Pollution Control Program management measures:

(8.3.1) Protection of Wetlands and Riparian Areas

Protect from adverse effects wetlands and riparian areas that are serving a significant nonpoint source abatement function and maintain this function while protecting the other existing functions of these wetlands and riparian areas as measured by characteristics such as vegetative composition and cover, hydrology or surface water and groundwater, geochemistry of the substrate, and species composition.

(8.3.2) Restoration of Wetlands and Riparian Areas

Promote the restoration of the preexisting functions in damaged and destroyed wetlands and riparian systems in areas where the systems will serve a significant NPS pollution abatement function.

Policy 26 – Preservation of Cultural Resources

It is the policy of the state of Ohio to provide for the preservation of cultural resource to ensure that the knowledge of Ohio's history and pre-history is made available to the public and is not willfully or unnecessarily destroyed or long, by: Protection of cultural resources on or eligible for state and national registers of historic places (O.R.C. 149.51 through 149.55.)

*Discussion:*

Attached is a figure indicating known cultural resources from Erie County. It appears that the project will damage a known archaeological site (late Archaic period). No information in the form of photographs, graphics or phase I archaeological survey has been submitted to the Ohio Historic Preservation Office. This information is required for the Ohio Historic Preservation to adequately evaluate and offer mitigation advice on significant cultural resources on site.

Additionally, the proposed project falls within the 100-year floodplain of Sandusky Bay (Lake Erie) as designated on the Erie County Flood Insurance Rate Map 390153 0055C, Effective Date September 20, 1995. Erie County is a participant in the National Flood Insurance Program (NFIP) and has adopted locally enforced flood damage reduction standards. The local floodplain administrator should be contacted for the specific development standards and permits. Mr. Alex MacNicol, Director of County Planning Commission, serves as the appropriate contact. Mr. MacNicol can be reached at (419) 627-7792 or 2900 Columbus Ave., Sandusky, OH 44870. On January 22, 2001, the ODNR Division of Water sent a letter to you indicating that a water withdrawal facility registration was required since you use pumps capable of withdrawing more than 70 gallons of water per minute. According to the Division of Water, you have yet to register your facility.

ODNR cannot stress enough the public concern that has been voiced regarding this project. This is a highly visible project, and ODNR personnel in the area have handled many questions from the public regarding this project. After reviewing these concerns and considering the impacts of the proposed activity on beneficial functions of the Sheldon Marsh complex important to the public interest, ODNR believes the negative impacts this project will have on unique resources of the state far outweigh the benefits the project will have to one individual business. Based on ODNR's consistency denial of the project, the Corps may not authorize an individual permit for this project. Additionally, ODNR is requesting that the Corps order full restoration of this unique area as soon as possible, particularly in light of the information shared in this letter and previous correspondence authored by ODNR submitted to the Corps.

June 11, 2001  
Page 8 of 8

This letter also serves as formal notice to the applicant, as required under 15 C.F.R. 930.64(e), that Ohio's objection to its consistency determination may be appealed to the Secretary of the United States Department of Commerce within 30 days of receipt of this letter. Your appeal must be based on the grounds that the proposed activities is (1) consistent with the objectives or purposes of the Coastal Zone Management Act, or (2) is necessary in the interest of national Security, and thus, may be federally approved.

A copy of this letter will be transmitted to the U.S. Army Corps of Engineers and to the Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration (U.S. Department of Commerce). If you have any questions or need additional information, please contact Kim Baker at 614-265-6411.

Sincerely,

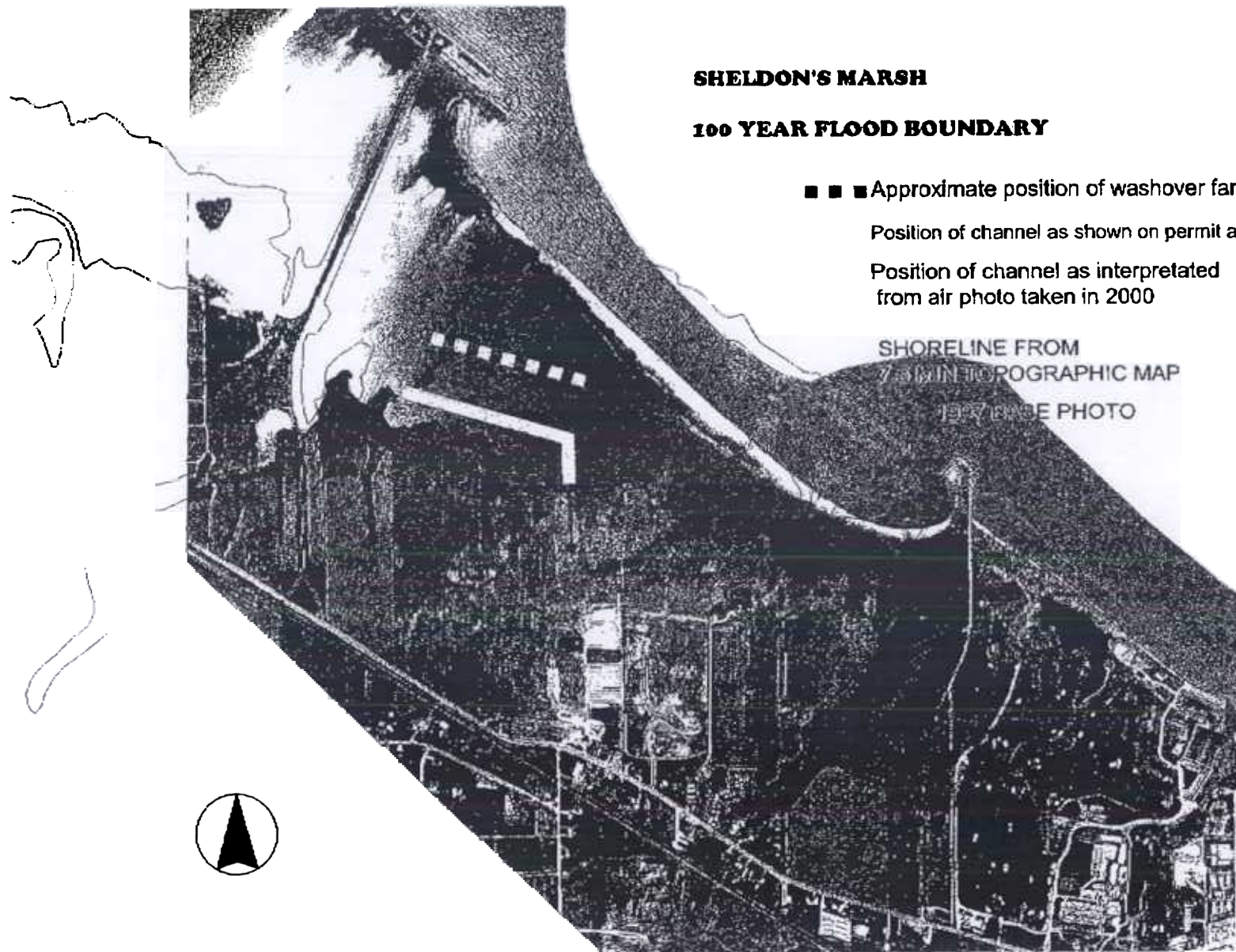


Wayne R. Warren, Chief  
Division of Real Estate and Land Management

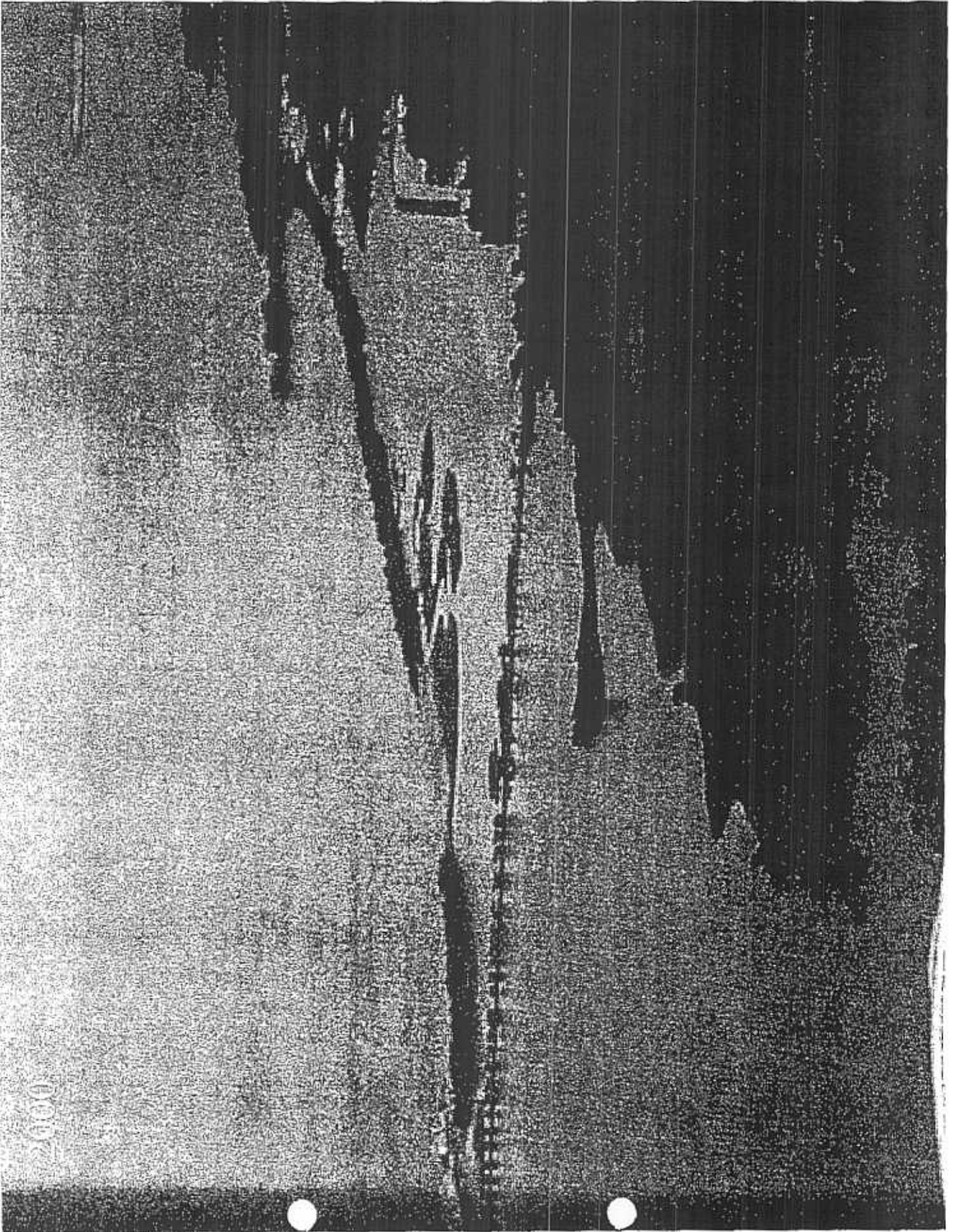
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**Attachments**

cc: Scott Zody, Administration  
Mike Colvin, REALM  
Don Guy, GeoSurvey  
John Watkins, Water  
Becky Jenkins, Wildlife  
Stu Lewis, DNAP  
Dick Bartz, Water  
Pat Fagan, Engineering  
Laura Fay, Ohio EPA  
Dave Snyder, Ohio Historic Preservation Office  
Megan Sullivan, US Fish and Wildlife Service  
Tom Glatzel, US EPA  
David Kaiser, NOAA  
U.S. Army Corps of Engineers, Buffalo District



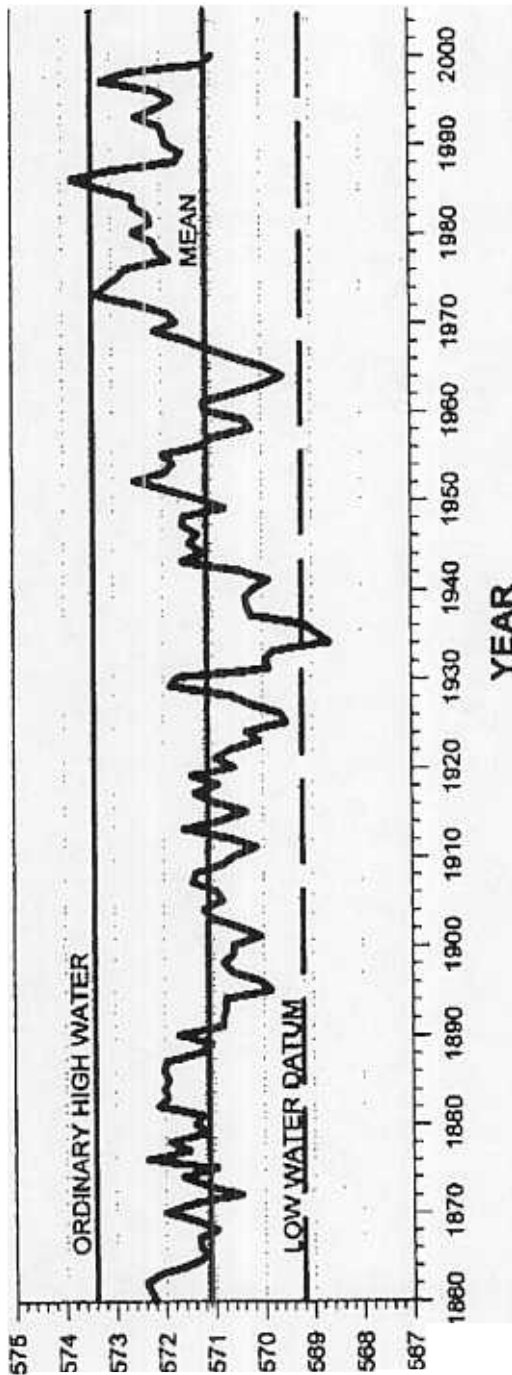






©2000  
©

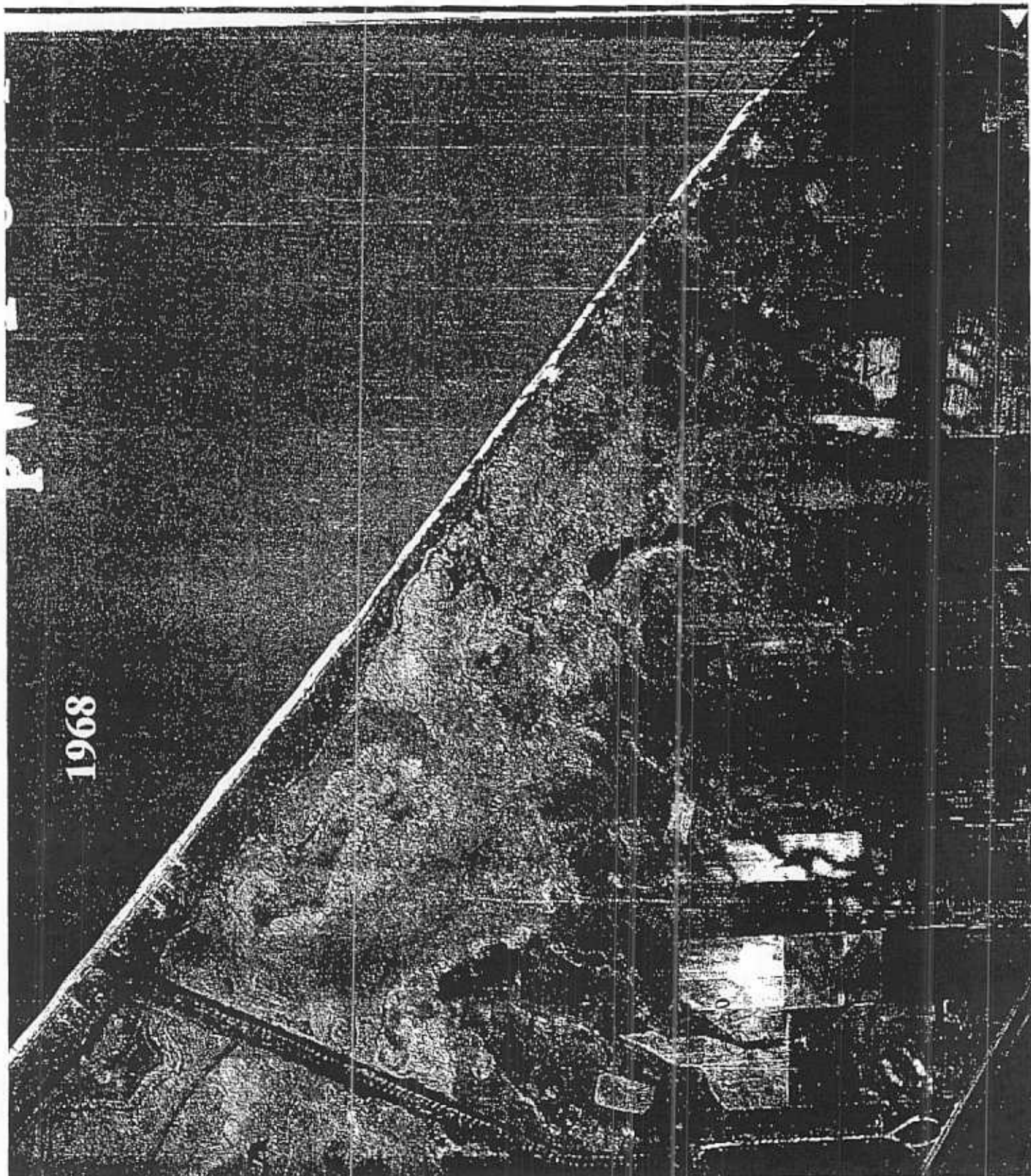
**LAKE ERIE WATER LEVELS, 1860-2001**  
(from NOAA data)



Lakelevel01

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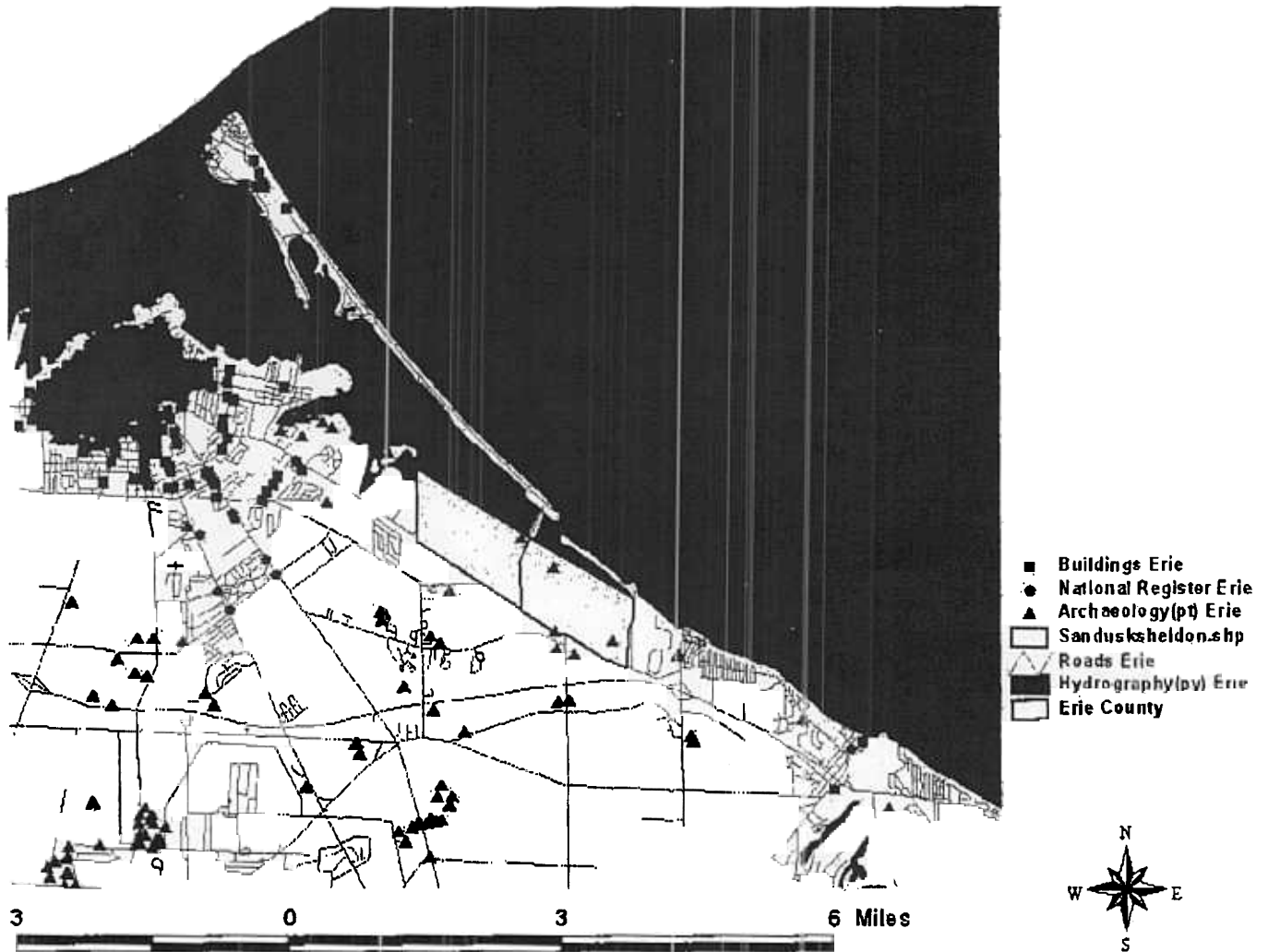






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# Known Cultural Resources - Erie County



**TAB "B"**



Mr. Wayne R. Warren, Chief  
 Division of Real Estate and Land Management  
 Ohio Department of Natural Resources  
 1952 Belcher Drive — Bldg. C-4  
 Columbus, Ohio 43224-1386

Dear Mr. Warren

Barnes Nursery, Inc. is in receipt of your letter of June 11, 2001 stating that ODNR objects to our Corps of Engineers permit application number 2000-02170(1) on the basis that our project is not consistent with certain policies of the Ohio Coastal Management Program (OCMP). Our firm will be appealing your formal notice of objection to our project to the Secretary of the United States Department of Commerce based on the grounds that our proposed activities are consistent with the objectives and/or purposes of the Coastal Zone Management Act. However, we would like to take this opportunity to respond to your comments and explain our East Sandusky Bay hydrology restoration project in more detail. We will demonstrate that this project is in harmony with OCMP policies and that when completed it will indeed enhance the environment and natural resources of this important coastal body of water.

Unfortunately you have made serious errors in labeling your figures and interpreting our intent which have led to faulty conclusions on your part. Please pay particular attention to where we have pointed out these errors. First, we would like to provide you with answers to the questions posed on pages 1 and 2 of your letter. The following responses correspond to your five questions:

#### Position of the "Canal"

The position of the hydrologic channel shown in Figure 1 of our application is essentially correct and is in general agreement with the orientation of the east northeast channel shown on your Figure A. However, your figure shows an extension of our project to the south at the southeastern end of the channel. This extension is not part of our application, but rather a preexisting intake channel. Additionally our Figure 1 shows the location of a proposed narrow feeder channel at the northeast end of the project which of course would not yet be present on the photograph in our Figure 5. The three-foot-wide feeder channel would only be the width of a pencil line if drawn to true scale, but is shown wider on our Figures 1 and 2 for ease of recognition. The actual dimension of the feeder channel is indicated in an adjacent note on Figure 2. Also your Figure A erroneously shows the position of the "overwash fan." Please note the accurate position on enclosed aerial photograph No. 347 (March 14, 2001)—the fan is considerably smaller and farther north than shown on your figure.

Understandably, it is difficult to match a 1979 USGS map (with 1969 topographic contours) with oblique aerial photographs taken in 2000 under various water level conditions. The south shore of East Sandusky Bay has receded landward since the USGS survey, thus the channel appears to cut across uplands on Figure 1, but in actuality the channel was excavated in open water. Because the bottom of East Sandusky Bay has very little relief and is so shallow, small differences in water elevation can produce dramatically different shoreline configurations. We were not provided with the dates or water levels for your photographs, but your Figures B and C were obviously taken on days with higher water levels than those shown in our Figure 5. For the above reasons the position of the channel may appear to be different on different photographs or maps, depending on such factors as water level, camera location and angle, and the relative time interval between when the photographs were taken or when the maps were drawn.

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#### Mud Flat and Feed Channel Elevation

The elevation of the East Sandusky Bay bottom (or mud flat during low water levels) surrounding the Barnes Nursery project site lies 1.5 to 1.6 feet above Low Water Datum (LWD) which is equivalent to an elevation of about 570.8 (IGLD, 1985). Thus, a feeder channel 1.5 feet deep would have a bottom that lies at 0 to +0.1 feet LWD, which is an elevation of about 569.3 feet (IGLD, 1985). On page 2, paragraph 1, line 9 of our application, please correct "about 568.8 feet (-0.4 feet LWD) to read "about 569.3 feet (+0.1 feet LWD)." This discrepancy was corrected in our Ohio EPA Water Quality Certification Application No. 2000-02170(1) of May 25, 2001 (page 2, final paragraph).

#### Use of Term Avulsion

*Glossary of Geology* (Bates and Jackson 1980 American Geological Institute, Falls Church, VA) defines "avulsion" in reference to coastal areas as "rapid erosion of the shore by waves during a storm." The usage of the word avulsion for the same process is also found in *Waves, Tides, Currents and Beaches: Glossary of Terms and Standard Symbols* (Wiegcl 1953 Council on Wave Research, The Engineering Foundation, Berkeley, CA). Certainly the devastating, single-storm, shore erosion event described by Carter (1973b) *The November Storm on Lake Erie*. ODNr, Div. Geological Survey Infor. Circ. 39, Columbus, OH) was rapid and resulted from storm-wave attack. Thus, the term avulsion is an appropriate geological term to describe the process observed by Dr. Carter.

#### Bathymetric Profiles

In an original report on the impact of a 1972 high-water storm to the shore at the base of Cedar Point, the investigator's measurements were given in metric units. For the benefit of general readers and to be consistent with Corps of Engineers practice, the metric units were converted to Standard English units in our application. However, on page 6, paragraph 2, line 2 of our application, one of the measurements retained the metric units designation, although the number itself had been converted to the English unit equivalent. In this instance, please read "300 m" to be "300 feet." The remainder of this paragraph in our application is correct as stated.

#### Sawmill Creek

The 1901 USGS topographic map of Sandusky Bay (our Figure 7) shows Sawmill Creek flowing into the bay at its eastern end. The map also shows a series of open water lagoons and marshes that extend from the stream mouth westward to where the bay flares open near the tip of Cedar Point. The map shows most of the open water connected by northwest trending channels. Although some narrow marshes do not show a specific channel on the map, it is well known that coastal marshes transmit large volumes of water. For example, during years when the entire estuary of Old Woman Creek is a marsh covered with wetland plants, the entire flow of Old Woman Creek flows through the marsh. The calculated average flow through the estuary is nearly 5 million gallons per day (Buchanan 1983 *Transport and Deposition of Sediment in Old Woman Creek Estuary, Erie County, Ohio*. Ohio Sea Grant Tech. Bull. OHSU-TB-10-83, Columbus, OH).

J. Wager, a civil engineer, surveyed the eastern end of Sandusky Bay in August 1911 (see our Figure 20) and mapped a very distinct channel with a sinuous thalweg that flowed from the mouth of Sawmill Creek to beyond Big Island near the present Cedar Point causeway. He labeled this waterway "Black Channel." In the vicinity of our project he shows the channel to be approximately 250 feet wide and flowing through marshland, which he labeled both north and south of the channel. His map, as well as the 1901 USGS map, shows this channel being joined by a number of tributaries flowing from the south, including ones in the vicinity of the Barnes Nursery channel restoration project. The 1909 Erie County, Huron Township Plat Map (our Figure 18) also shows the channel of Sawmill Creek flowing through East Sandusky Bay.

Even without the foregoing supporting evidence, it is obvious that a stream the size of Sawmill Creek would require a sizable channel to accommodate its discharge. Sawmill Creek has a drainage area of approximately 18 km<sup>2</sup>. Small streams in north central Ohio have an average discharge of 0.006 m<sup>3</sup>/sec/km<sup>2</sup> (Buchanan 1983). In the case of Sawmill Creek, this equates to a discharge flow of 1,665 m<sup>3</sup> per day or 1.23 million gallons per day. The flow generated by this quantity of water discharge is most likely the origin and the sustaining factor for the Black Channel that once coursed through East Sandusky Bay.

Thank you for providing the historical perspective based on ODNR data. This information has been useful in understanding the changes that have taken place in East Sandusky Bay. Analysis of the ODNR data in conjunction with information derived from our investigations and other sources has permitted us to further interpret the changes that have occurred and to better assess the consequences of our proposed hydrology restoration project. To this end, we offer the following points for your consideration:

#### Fate of Black Channel

Classical studies of transgressing barrier bars (e.g. Johnson 1965 *Shore Processes and Shoreline Development*, Hafner Publishing Co., New York, NY) demonstrate that as a barrier bar migrates landward, the drainage channel on the inside of the bar also migrates landward to keep pace with the transgression. Figure 12 of our application illustrates this phenomenon. On Figure 15 of our Ohio EPA Water Quality Certification Application, Johnson's 1965 diagram has been modified with labels that show the time sequence of events that have taken place at the base of Cedar Point barrier beach and what will likely happen in the future.

The Johnson sequence normally takes place over an extended period of time. Unfortunately Cedar Point has been starved of beach-building sand by the Huron Harbor structures and other shore structures farther to the east. With very little new sand coming in from the east, the transgression process was accelerated to the point where the Black Channel could no longer keep pace and was overrun and filled. Likewise, sand starvation resulted in the rapid recession of the shore off the present mouth of Sawmill Creek to the point where the stream debouched directly into Lake Erie rather than following through Sandusky Bay. With the loss of Sawmill Creek's flow, Black Channel was more susceptible to infilling and was less able to adjust landward as the bar transgressed.

Statements made at the Corps of Engineers application public hearing on June 12, 2001 by several long-time residents of the area indicated that Black Channel was in existence until the Cedar Point barrier beach was breached by storms in the 1970s and 1980s. As pointed out in your review, the rapid retreat of the barrier beach at the base of Cedar Point (approximately 850 feet) during these storms destroyed much of the Black Channel between Willow Drive and Sheldon Marsh causeways.

#### Subaerial Exposure of East Sandusky Bay Bottom

Under average water level conditions in the vicinity of our project, East Sandusky Bay is an extensive open water environment, thus the bottom is a subaqueous environment. At mean lake level this part of the bay is covered with at least 0.7 feet of water (water level +2.2 feet LWD). However, during periods when the lake falls to below +1.5 feet LWD large expanses of bay bottom become exposed mud flats (subaerial environment). On these occasions, which were common during the past fall, winter and spring (2000-2001), the only water bodies in the bay were the remnants of the Black Channel southeast of Willow Drive causeway bridge and in the hydrologic channel we excavated in June and July 2000.

We agree that even if the Black Channel were reopened, the adjacent coastal wetlands above the sill elevation of the channel would not flood and would be subaerially exposed when the elevation of the lake drops below the sill. However, the ground water recharge capacity of coastal embayments is well documented and is one of the important values and functions of wetlands. Our hydrologic channel runs along the edge of coastal wetlands and thereby serves as a source of ground water for the adjacent wetlands. These wetlands benefit from the existence of the channel, particularly during dry, low-water periods. Water from our channel percolates laterally and saturates the soils beneath the adjacent coastal wetlands. Saturation of the root systems of wetland plants is essential for obligate species.

#### Channel on Landward Side of Cedar Point Bar

The elimination of Sawmill Creek flow into East Sandusky Bay appears to have taken place well before the major retreat of the barrier bar in the 1970s and 1980s, perhaps during the then record-high water levels of the early 1950s (see your Figure D). Without this flow, it is unlikely that "a deep, abandoned, channel" would have existed on the landward side of the barrier beach just prior to the major retreat. More likely the channel would have been 1 to 2 feet deep, similar to the remnant channel that still exists southeast of Willow Drive causeway bridge, with smaller tributary channels flowing from the south. High lake levels and the severity of the northeast storms are the most probable causes of the rapid retreat. Examination of the April 1987 aerial photograph of East Sandusky Bay (our Figure 11) shows no evidence of a deep channel in the wave height and refraction patterns that would be expected if such a channel still existed.

#### July 1986 Bathymetric Profiles

The bottom profiles recorded by the Ohio Geological survey in July 1986 were performed in water ranging in depth from 3.0 to 4.3 feet. The profiles were said to be run "across the wetland." Reviewing aerial photographs bracketing the survey period, and considering the depth of water in which the profiles were run, it is unlikely that any significant growths of wetland plants occurred along the profile lines. Open water embayment or lagoon, rather than wetland, would be a more accurate description of study area based on the lack of wetland plants.

The results of the profiles do show the existence of a shallow channel "just landward of the barrier" about 1.3 feet deep and an even shallower channel about 0.5 feet deep in the vicinity of our channel restoration project. These results are consistent with our interpretation as stated in the preceding point, "Channel on Landward Side of Cedar Point Bar" and which will be discussed under the point titled "Evidence of Channels in Excavated Channel."

#### 1901 USGS Topographic Map

The USGS topographic sheet was published in 1901, but it is uncertain when the field mapping was done, what the water level was at that time of the field mapping, or how detailed the mapping was for East Sandusky Bay. The civil engineer's map of 1911 (our Figure 20) gives a more detailed representation of the project area as it appeared in the early part of the last century. Nonetheless, your assumption that circulation via Lake Erie and the main part of Sandusky Bay may have been restricted historically when lake levels were extremely low is well taken. However a century ago, Sawmill Creek still flowed into the eastern end of Sandusky Bay, delivering some 450 million gallons annually to the bay based on the size of its watershed. This flow, plus water supplied from several small tributaries along the south shore, would have provided adequate circulation to sustain the coastal marshes in the east end of the bay even during periods of low lake level. By definition, wetland plants require saturated soils to grow and flourish. Thus, the fact that the 1901 map shows marsh vegetation throughout the east end of the bay, indicates that even under these conditions adequate water circulation was occurring in the bay to support wetlands.



#### Willow Drive Channel

Your letter states that Figure D shows a "channel system visible on 1937 aerial photographs" (page 3, line 9). However, the Figure D with your letter is a graph of "LAKE ERIE WATER LEVELS, 1860-2001." None of the figures in your packet contain a 1937 label.

As we have asserted in our application, certainly the construction of the causeways at Willow Drive and Sheldon Marsh State Nature Preserve have greatly altered the hydrology of East Sandusky Bay. While the bridge at the northern end of Willow Drive does permit a large flow of water to East Sandusky Bay (cross-section area as measured by our consultant on October 5, 1991 was 367 ft<sup>2</sup>), the Sheldon Marsh causeway does not appear to have any functioning culverts. Thus, the large wetlands between the later causeway and Sawmill Creek are precluded from functioning as coastal wetlands.

The breaching of the barrier beach may, at times, permit additional water to flow into the east end of the bay, but under periods with sustained southwest winds (the dominant conditions for the region) water from the main part of the bay is drained directly to the lake through the breach, bypassing the east bay. Also during periods of falling lake levels, often associated with prevailing southwest winds, water from the east bay is sucked out through the breach, dewatering the bay bottom.

#### 1968 Hydrologic Conditions

Your Figure E is labeled 1968. You contend that extensive vegetation is shown in this aerial photograph during water level conditions 0.5 feet higher than present levels. However, we suspect that this photograph is mislabeled and that indeed it was taken in 1937, a period when lake levels were at or near their all-time record low. The mid 1930s were the "dust bowl" years when the Great Lakes were extremely low for several years prior to 1937. Thus, during such extreme conditions the East Sandusky Bay bottom would be expected to vegetate over, but not under the conditions prevalent in 1968. By referring to Figure 10 of our application (changes in the position of the barrier bar from 1937 to 1968 drawn from aerial photographs) it is obvious that Figure E is not a photograph taken in 1968, indeed it was taken before the NASA pumping station was constructed during World War II.

#### Evidence of Channels in Excavated Channel

As indicated earlier in this document, the high-water storms of the 1970s and 1980s most likely resulted in the final destruction of most of the Black Channel between the Willow Drive and Sheldon Marsh State Nature Preserve causeways as the barrier bar transgressed the east end of the bay. The 1987 aerial photograph (our Figure 11), clearly shows waves entering the interior of the bay. Fine-grained sediments were eroded at this time (note the dark organic sediments being exhumed by the waves), with silt being carried into the bay. As a consequence the Black Channel was either over run or filled with sediment. The results of this process can be seen in our Figure 21 and the accompanying aerial photograph No. 347 (March 14, 2001). A series of five black sediment patches occur along the length of the side-cast island north of the hydrology channel. These represent former waterways that were part of the Black Channel system. They may represent a sinuous east-west channel, or more likely small tributaries flowing into the Black Channel from the south. The latter possibility is supported by dark lineaments in the soils, south of the hydrologic channel, which line up with the patches on the island. The positions of the former channels through the island correspond to where we propose to place the new cuts.

#### Revegetation of East Sandusky Bay Bottom

As discussed earlier in this document, the record-low lake levels of the mid-1930s, resulted in East Sandusky Bay to be dewatered for several years, permitting vegetation to spread across the bottom. However, it is unlikely that similar conditions existed in 1968. We suspect that your Figure E is mislabeled, and therefore your interpretation and conclusions regarding vegetation in East Sandusky Bay during 1968 are erroneous. We suggest you compare your Figure E with aerial photographs from the mid-1930s to determine the correct date.

Mr. Wayne R. Warren  
June 30, 2001  
Page 6

Concluding Statement

We agree that East Sandusky Bay, especially the portion encompassed by Sheldon Marsh State Nature Preserve is a good example of a coastal wetland embayment protected by a barrier bar system. The protection provided by this bar and the hydrologic circulation within the bay are the prime reasons that the wetland has flourished. However, the deterioration and retreat of the bar in recent decades, accelerated by the deleterious effect of coastal construction projects, has placed the future existence of the east bay in peril.

Specific action needs to be taken to reverse this trend. The bar needs to be stabilized and caused to regress to its former (pre-breach) condition. At the same time the bay's hydrologic circulation needs to be restored. Circulation can be greatly enhanced by creating additional openings in the Willow Drive causeway and eliminating or bridging the Sheldon Marsh causeway. We believe that our proposed project will go a long way to restoring circulation that has been lost to the east bay caused by numerous artificial alterations.

You point out that constructing a channel in East Sandusky Bay, particularly through a dedicated State Nature Preserve is prohibited by State law. However, our position is that restoring the natural circulation that has been destroyed by artificial means would not violate the spirit of the law. Our project will indeed help reestablish the former natural hydrology of the bay. As such this action would not be prohibited under O.R.C. Section 1517. If this were not the case, then projects such as the one proposed with the U.S. Army Corps of Engineers to protect the barrier beach would also be prohibited.

Your letter indicates that ODNR objects to our project because it is not consistent with the policies of "OCPM." We believe you meant to state "OCMP" for the Ohio Coastal Management Program. Your letter enumerates eight policies for which concerns are stated. We would like to take this opportunity to address each concern and demonstrate how our proposed project is consistent with OCMP policies.

Policy 2 - Shore Erosion Control

Our proposed project is consistent with this OCMP policy because shore erosion control is not a design feature of this project. Three sections of our application are relevant to the ODNR concern that a shore erosion control structure permit be obtained for the proposed project:

Section 19. Nature of Activity - no reference to erosion control is mentioned in this section.

Section 19. Proposed Project Purpose - no reference to erosion control in this section.

Section 20. Reason for Discharge - the primary purpose of the discharge of dredged material, as stated is "to form a series of islands." As specified in Sections 18 and 19, the main purposes of these islands are "to foster wetland plant zonation," and for "creating avifauna habitat." In Section 20, secondary purposes are listed which include "erosion control from waves" and "retard sediment infilling of the hydrologic channel." We specifically do not refer to "shore" erosion control. Our statement in Section 20 should be taken to mean control of subaqueous erosion relative to the channel, not shore erosion. Our objective in this regard is to control the mobilization of sediments on the bottom of the bay that might be deposited in the hydrologic channel. The islands will be stabilized by planting native herbaceous and woody plants and establishing a sand beach on the bay side. This will preclude the need for hardening the shore with objectionable, unnatural rip rap. Because the islands afford siltation protection and because no sediment-laden tributaries empty into the hydrologic channel, maintenance dredging should not be required.

Therefore, because the islands have other primary purposes and because their design is not for shore erosion control, we do not believe that O.R.C. 1521.22 applies to our application.

Policy 6 – Water Quality & Policy 17 – Dredging and Dredged Material Disposal

Our proposed project is consistent with these OCMF policies by “enabling the use of the State’s coastal waters for agricultural needs” while not impairing water quality. No dredging or disposal of dredged material has or will take place in wetlands, other than the restored intrusion that is described below.

On May 25, 2001, Barnes Nursery, Inc. submitted an application for a Section 401 Water Quality Certification for our project to the Ohio Environmental Protection Agency. Our response to several inquiries (Nos. 8a, 8c, 10a, 10b, & 10f) which are relevant to ODNR’s concerns are summarized here.

Pursuant to Nationwide Permit No. 27 (2000-02170), issued by the U.S. Army Corps of Engineers to Barnes Nursery, Inc. on June 20, 2000, most of the work proposed in elements No. 1 and No. 2 of our current application was completed in July 2000. At the distal (west) end of the hydrologic channel, construction had encroached about 130 feet in an emergent wetland and a mound of earth about 10 to 15 feet high was stock-piled at the distal end of the island. Work on the project was halted in July 2000 before it could be graded to project height. In April 2001 the Corps of Engineers authorized restoration of the encroached wetland. This restoration work was completed on April 19, 2001 by refilling approximately 200 feet of dredged channel and reducing the earthen mound to its original topography.

No additional discharge of dredged material is anticipated for this project. Material excavated from the existing island to create the archipelago will be placed on the islands to the north (lakeward) side of the channel. The islands will serve several purposes: (1) provide erosion control for the channel from waves generated in East Sandusky Bay and Lake Erie during periods of barrier bar overtopping, (2) retard sediment infilling of the hydrologic channel, (3) foster establishment of a diverse wetland plant community by adding approximately 4,000 feet of shoreline to the bay (sloped to provide the proper gradient for plant zonation to occur), and (4) create high-quality, isolated avifauna habitat in a low-disturbance environment. The formation of a sandy beach front on the north side of the island, which has already begun to occur, will foster use by shorebirds which may include the piping plover (*Charadrius melodus*). The shore could be further enhanced for this purpose by the placement of additional sand from an external source. Barnes Nursery, Inc. pledges to undertake such a beach nourishment initiative and an unwanted bird species control program with the planning and direction of critical species habitat specialists of the U.S. Fish and Wildlife Service and animal damage control specialists of the U.S. Department of Agriculture, National Wildlife Research Center.

The work required to complete the project, as described in the application, will involve construction in the open water of East Sandusky Bay. No dredged material will be discharged to the surface waters of the bay. Material removed from the existing island, to grade the slopes and form the archipelago, will be placed above ground on the islands. A silt-barrier fence was installed for the wetland restoration component of this project. A similar deployment may be necessary during the island archipelago and shore grading components of the project. The need for other water pollution control measures is not anticipated.

Because the island is composed of ancient lacustrine sediments, minimal human contamination is anticipated. Minimal water discoloration is anticipated during the construction period, which should require no more than three days. Any turbidity resulting from this work should dissipate rapidly and be within the normal turbidity ranges expected from natural processes such as wave dissipation and fish spawning activity. This project will adhere to the State’s antidegradation policy as it applies to agricultural practices.

To address concerns that our project will draw off water that would normally continue to flow eastward into Sheldon Marsh, we have analyzed the hydrologic circumstances of this portion of Sandusky Bay and have computed the water balance for various lake levels. East Sandusky Bay (between the Willow Drive and Sheldon Marsh causeways) has a surface area of approximately 290 acres (12,660,000 square feet) as calculated from USGS topographic maps. The bottom of East Sandusky Bay is virtually flat and lies at an elevation of 570.7 feet (IGLD, 1985) or 1.5 feet above Low Water Datum (LWD), rising slightly to an elevation of +1.6 feet LWD at the project site. As recorded by the Ohio Geological Survey (OGS), the long-term mean water level in Sandusky Bay is 571.4 feet in elevation or +2.2 feet LWD. OGS has calculated that on average, Sandusky Bay experiences a daily water level fluctuation of 0.6 feet (Donald Guy, personal communication). The major sources of water flowing into East Sandusky Bay are (1) the main portion of Sandusky Bay via the Willow Drive bridge opening and (2) directly from Lake Erie via the breach in the Cedar Point sand spit at Point Retreat. Minor contributions of water to the East Bay also come from surface runoff, tile drains, and small tributary ditches.

The fluctuations of water level in Lake Erie and Sandusky Bay are primarily wind induced surges, winds tides, or seiches. As the water level in Lake Erie or Sandusky Bay rises above the water level or bottom in East Sandusky Bay, water flows into the East Bay until it has equalized with the larger bodies of water surrounding it. Conversely, as the water level in Lake Erie or Sandusky Bay drops below the water level in the East Sandusky Bay, water flows out of the East Bay until it has either equalized with the larger bodies of water or it has been drained dry.

At the project site, the existing berm island is approximately 1,500 feet long and 50 feet wide, yielding an area of 75,000 square feet or 1.7 acres. This equates to less than 0.6% of the bottom of East Sandusky Bay. The existing dredged channel at approximately 1,500 feet long, 5 feet deep, and 40 feet wide with a 2 to 1 side slope, can hold 262,500 cubic feet or 1,962,500 gallons of water. This equates to less than 3% of the water volume of East Sandusky Bay at mean water level.

The following table shows the volume of water entering East Sandusky Bay for each 0.1 foot rise in water level and the corresponding percentage of water that could be held in the irrigation channel if filled to capacity:

Water Level (feet LWD)	Water Depth (feet)	Water Volume		Channel
		(cubic feet)	(gallons)	(%)
+1.5	0.0	0	0	—
+1.6	0.1	1,266,000	9,461,680	20.7
+1.7	0.2	2,532,000	18,939,360	10.4
+1.8	0.3	3,978,000	29,755,440	6.6
+1.9	0.4	5,064,000	37,878,720	5.2
+2.0	0.5	6,330,000	47,348,400	4.1
+2.1	0.6	7,596,000	56,818,080	3.3
+2.2 [mean]	0.7	8,862,000	66,287,760	3.0
+2.3	0.8	10,128,000	75,757,440	2.6
+2.4	0.9	11,394,000	85,272,120	2.3
+2.5	1.0	12,660,000	94,696,800	2.1
+2.6	1.1	13,929,000	104,166,480	1.9
+2.7	1.2	15,192,000	113,636,160	1.7
+2.8	1.3	16,458,000	123,105,840	1.6
+2.9	1.4	17,724,000	132,575,520	1.5
+3.0	1.5	18,990,000	142,045,200	1.4

Considering that the mean daily water level fluctuation in Sandusky Bay is 0.6 feet, this equates to a mean daily exchange of water between East Sandusky Bay and the adjoining larger bodies of water of nearly 7,600,000 cubic feet or over 28 times the volume of water held in the channel. Even with a minimal 0.1 foot rise in water level, about 5 times as much water enters East Sandusky Bay as can be stored in the channel.

Essentially the water level in East Sandusky Bay is controlled by the forcing function of the water level in the larger adjoining bodies of water. Therefore, a depression within East Sandusky Bay will not govern the water level in East Sandusky Bay nor will it influence the distribution of water to various portions of the bay. The elevation of the bay bottom in relation to lake level dictates whether the bottom is covered with water or not. Because the sill at the channel intake is about 0.1 feet above the common bottom of the East Bay, water will not drain into the channel when water levels in the lake are below the bay threshold.

Also, concerns have been raised about the need for continued maintenance of the proposed feeder channel. Our position is that the natural oscillation of bay water levels would create adequate velocities in the channel to keep it open. To support this contention, we have determined velocities in the feeder channel, under various water level heads, and related them to sediment transport capabilities.

Our calculations relate to water flowing from the open lake, through the feeder channel, to the reservoir (hydrologic) channel and conversely, from the reservoir channel to the open lake. Water levels in Sandusky Bay continually oscillate with a mean daily excursion of about 0.6 feet. Thus, on average this produces a hydraulic head of 0.6 feet first on one side of the feeder channel, say on the lake side as the lake rises, then a head of similar magnitude on the reservoir channel side of the feeder channel as the lake falls.

Torricelli's equation can be applied to determine the velocity in the feeder channel under various head conditions. The lake can be considered a reservoir with an opening in its side (the feeder channel). Torricelli's theorem states that the velocity of water through the opening is equal to the square root of the product of two times the acceleration due to gravity times the head (Henke 1966 *Introduction to Fluid Mechanics*, Addison-Wesley Publ. Co., Reading, MA, p. 57). The following table shows the calculated velocity in the feeder channel for various hydraulic heads from 0.1 to 1.0 feet at either the lake side or reservoir channel side of the feeder channel:

Hydraulic Head (feet)	Velocity	
	(feet/sec)	(cm/sec)
0.1	2.5	76
0.2	3.6	110
0.3	4.4	134
0.4	5.1	155
0.5	5.7	174
0.6	6.2	189
0.7	6.7	204
0.8	7.2	219
0.9	7.6	232
1.0	8.0	244

Hjulström (1935 *Studies of the Morphological Activity of Rivers as Illustrated by River Fyris*, Upsala Univ., Sweden, Geol. Inst. Bull. V. 25, p. 295; and 1939 *Transportation of Detritus by Moving Water*, in P. D. Trask, ed., *Recent Marine Sediments*, Am. Assoc. Petroleum Geologists, Tulsa, OK, p. 10). has developed a classical, and well accepted, graph which predicts the velocities required to place loose particles in motion and transport them in a channel for different size grades of sediment. The offshore sediments in Sandusky Bay are dominated by silt-sized particles, with lesser amounts of clay and sand (Shaffer 1951 *Shore erosion on Sandusky Bay*, Ohio Journal of Science 51(1): 1-5. [reprinted in 1968 by Ohio Department of Natural Resources, Division of Geological Survey as Report of Investigations No. 7], p. 3; and U.S. Army Corps of Engineers 1953 *Ohio Shore Line of Lake Erie, Sandusky Bay, Ohio, Beach Erosion Control Study*, Appendix IV. 83rd Congress, First Session, House of Representatives Document No. 126, p. 8). The threshold velocities to mobilize and transport sediment particles of these size grades are shown below:

Particle	Median Diameter (microns)	Threshold Velocity for Sediment Mobilization (cm/sec)
Clay		
Medium		150
Coarse	2	100
Silt		
Fine	4	75
Medium	8	50
Coarse	31	20
Sand		
Fine	62	17
Medium	250	15
Coarse	1000	20

Thus it can be seen that the Torricelli or "jet" effect developed in the feeder channel with a minimal head of about 0.4 feet will be sufficient to keep the channel clear of deposited clay particles. A head of less than 0.2 feet will generate velocities great enough to keep silt and sand from being permanently deposited.

An alternative approach is to use the Chezy-Manning formula (Zilly 1975 *Handbook Of Environmental Civil Engineering*, Van Nostrand Reinhold, New York, NY, p. 520-522). Assuming a channel roughness factor of 0.013 to 0.017 for a straight, uniform earth channel (Newson 1994 *Hydrology and the River Environment*, Clarendon Press, Oxford, England p. 23) the following velocities are obtained for various hydraulic heads:

Hydraulic Head		Velocity	
(feet)	(slope)	(feet/sec)	(cm/sec)
0.1	0.0002	1.7	51
0.2	0.0004	1.9	58
0.3	0.0006	2.1	64
0.4	0.0008	2.3	70
0.5	0.0010	2.5	76
0.6	0.0012	2.7	82
0.7	0.0014	2.9	88
0.8	0.0016	3.1	94
0.9	0.0018	3.3	101
1.0	0.0020	3.5	107

In this approach it can be seen that the slope created by a head of 0.5 feet is required to remove settled silt and sand from the feeder channel, whereas a head of 1.0 feet or greater would be needed to erode the clay from the channel bottom. However, because clay-sized particles stay in suspension even under very low velocities ( $<0.1$  cm/sec), no deposition of particles in this size range would be anticipated in the feeder channel.

In summary, the foregoing calculations indicate that the normal water level fluctuations in East Sandusky Bay are sufficient to create the hydraulic heads and attendant velocities necessary to maintain a free and clear feeder channel. Thus, no maintenance dredging will be required under typical conditions. However, devastating storms, such as those experienced in 1972 and 1987, could reconfigure or destroy the feeder channel.

Policy 8 – Nonpoint Source Pollution & Policy 12 – Wetlands

Our proposed project is consistent with this OCMP policy, particularly management measures 8.3.1 and 8.3.2 (Protection and Restoration of Riparian Areas and Wetlands). *Glossary of Geology* (Bates and Jackson 1980) defines riparian land as "situated along or abutting upon a stream bank." Because our project is located on East Sandusky Bay, an embayment of Lake Erie rather than a flowing stream, it would be more accurately described as "littoral" instead of "riparian." However, the wetland aspects of this policy do apply to our project.

Our project will provide protection to adjacent wetlands by forming a quiescent water body between the islands and the coastal wetlands along the south shore. As discussed earlier, the hydrologic channel will supply water for groundwater recharge to these wetlands during low lake level intervals. Our East Sandusky Bay hydrology restoration project will result in approximately five acres of new emergent wetlands to occupy the barren mud bottom between the present wetland border and our hydrologic channel. Because the interior slope of the islands will be graded to a gentle 4 to 1 slope (run to rise) they will foster the development of a diverse zonation of hydrophytic plants along 1,500 feet of shoreline. As described earlier, a small intrusion of approximately 0.3 acres into coastal wetlands was made as the project was constructed in July 2000. Although this intrusion was permitted under the Corps of Engineers permit that was in effect at the time of the construction, as a good faith effort, with the Corps approval, Barnes Nursery, Inc. restored the intruded area to its original topography in April 2001.

The project area, as specified in our current application, constitutes an open water environment lacking any wetland plants and is typically submerged by the waters of Sandusky Bay. The boundary of coastal wetlands at the project site is delineated on our Revised Figure 2 (Figure 6 of Ohio EPA Water Quality Certification application). To resolve the question of wetlands verses mud flats verses open water environment, we have taken average conditions to be typical of the site. Under these conditions the project area is submerged and no emergent, submersed, or floating-leafed aquatic plants are present.

The long-term mean water level of Sandusky Bay as recorded at the ODNR, Division of Geological Survey gaging station in Sandusky is +2.2 feet above low water datum (LWD) or elevation 571.4 feet (IGLD, 1985). For reference, the water level during the agency site visit (May 22, 2001 at 2:00 PM) was +2.1 feet LWD, or elevation 571.3 feet, very close to the mean or normal water level in East Sandusky Bay. The general elevation of the bottom of East Sandusky Bay is +1.5 feet LWD and about +1.6 feet LWD at the project site. This indicates that under normal (mean) conditions, the water depth at the project site prior to construction was at least 0.6 feet.

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Based on these data, our position is that the project area constitutes an open water environment. The mud flat in East Sandusky Bay that has periodically appeared in recent years is the result of abnormally low lake levels and should not be taken as typical or normal conditions. Because the project was constructed in an open water environment, we do not believe that further wetland or mud flat restoration/mitigation efforts are appropriate for this project.

Under the "Discussion" heading on page 5, you make the statement that the Sheldon Marsh "wetland is hydrologically unrestricted with no lakeward or upland border alterations." This statement is not accurate. Firstly, ODNR, Division of Natural Areas and Preserves (in conjunction with NASA, Plum Brook Station) maintains and has enlarged a 3,000-foot-long causeway that totally restricts natural drainage and connectedness with several coastal zone marshes along the east side of the Nature Preserve. Thus the upland border is most definitely restricted. Secondly, the western border of the wetland complex is severely restricted by the stone rip rap causeway that supports Willow Drive. Thirdly, the NASA pumping station at the Northeast corner of the Preserve is armored with large dimension stone capped with concrete and protected by massive cells of steel sheet piling that were driven into the barrier beach. To say that these imperious structures do not restrict hydrologic circulation is nonsense.

Conversely, our proposed project calls for six hydrologic openings along the 1,500-foot length of our project to insure free circulation. Connection between coastal marshes and the lake is essential to the viability of the wetlands—this feature is a keynote of our design.

You also state on page 5, "Activities conducted by the applicant have already adversely affected Sheldon Marsh State Nature Preserve." However, you neglected to specify in what way our project has adversely affected the Preserve. Without any specific information it is impossible for us to address this statement in any meaningful way.

In summary, it can be seen that our proposed project will both protect and enhance existing wetlands, will create new wetlands, and restore damaged wetlands without intruding existing marshes. Because of the unrestricted circulation design of the project and its location beyond the border of existing wetlands, no adverse impact to the adjoining marshes is foreseen. By restoring all disturbed coastal wetlands to their pre-existing condition, we believe we are now in compliance with the State's wetland policy. By creating at least five acres of new wetlands and 1,500 feet of additional wetland shore on a non-vegetated, bay bottom, we are supporting OCMP's policy to "where feasible, restore and create wetlands to increase the State's wetlands base."

#### Policy 14 – Rare and Endangered Species

Our proposed project is consistent with this OCMP policy by providing additional habitat for rare and endangered plant and animal species. The project lies on about 3.5 acres of East Sandusky Bay bottom (about 1% of the bay's bottom), but protects over 5 acres of bottom that would normally be exposed to storm action if not for the project. This protected area will form a quiescent refuge where shorebirds can forage during rough conditions in the bay and where state-listed rare wetland plants (annuals and low in stature) can thrive.

As discussed earlier, the formation of a sandy beach front on the north side of the island, which has already begun to occur, will foster use by shorebirds which may include the piping plover (*Charadrius melodus*). The shore could be further enhanced for this purpose by the placement of additional sand from an external source and at the same time help stabilize the island's bay shorelines. Barnes Nursery, Inc. offers to cooperate with the U.S. Fish and Wildlife Service and the U.S. Department of Agriculture, National Wildlife Research Center in formulating and undertaking a beach nourishment initiative and an unwanted bird species control program that would create additional plover habitat in East Sandusky Bay. The island habitat would be far less susceptible to open-lake wave attack than the barrier beach to the north.



One adult and four immature bald eagles (*Haliaeetus leucocephalus*) and two tundra swans (*Cygnus columbianus*) have been seen in the vicinity of the island and in the hydrologic channel. On June 12, 2001, during a Corps of Engineers site visit, a bald eagle landed on the island and was observed feeding on a bullhead (*Ameiurus* sp.) that had been captured in the adjacent channel. When Corps biologists approached the eagle took flight and landed in a large cottonwood tree that overhangs the restoration area. During the same site visit Corps biologists observed and photographed a threatened species of tiger beetle (*Cicindela hirticollis*) near the crest of the island.

#### Policy 15 – Exotic Species

Ohio DNR, Division of Natural Areas and Preserves, manages Sheldon Marsh State Nature Preserve which is located adjacent to the proposed project. Discussions have been held with Preserve personnel and a coordinated plan has been formulated with Mr. Gary Obermiller, District Preserve Supervisor, for the control of invasive plant species, particularly common reed (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria*). The first phase of this plan will be a cooperative effort to chemically control invasive plants on the peninsula at the western end of the project. The northern, undisturbed portion of the peninsula lies within Sheldon Marsh State Nature Preserve, whereas the central portion (the area where wetland restoration was completed in April 2001) is in private ownership. The undisturbed southern portion of the peninsula is also held in private ownership. Both the northern and southern portions are heavily infested with *Phragmites australis* and have substantial growths of *Lythrum salicaria* as does much of the adjacent shoreline of East Sandusky Bay (see our application for Ohio EPA Water Quality Certification, Figure 16). Invasion of the restored area by these undesirable plants has already begun, therefore a cooperative control program will benefit both the State Nature Preserve and the project area.

This plan was approved in the field, at the project site, by the Corps of Engineers on May 22, 2001. We intend to use this invasive plant control effort on the restored area as a pilot study to limit the spread of *Phragmites australis*. If successful, this effort can be extended to control invasive plant species along the entire island archipelago. Thus, we believe our proposed project is consistent with OCMP policy by our efforts to "control exotic species to preserve the balance and diversity" of the East Sandusky Bay ecosystem.

Fortunately very little *Phragmites* has been observed on the island. Observations on June 27, 2001 revealed that lush growths of smartweed (*Polygonum* spp.) and other desirable native plant species are vegetating the island. The densest growth patterns correspond to the five former Black Channel patches that are shown on enclosed aerial photograph No. 347 (March 14, 2001).

#### Policy 26 – Preservation of Cultural Resources

Archaeological Site. Figure G, attached with your letter shows an archaeological site in the vicinity of our project. This site, 33-ER-436 is located to the south and west of our project. The site produced only one artifact — a slate, notched, butterfly bannerstone. The artifact was recovered during a survey of the site in September 1986. A preliminary documentation form for the site, prepared by Mr. Eugene Edwards and Dr. Jonathan E. Bowen, was received by the Ohio Historic Preservation Office on May 25, 1994. Mr. Edwards was contacted by Barnes Nursery on June 21, 2001 to inquire as to the specific location of the site and any other archaeological information that he could make available. Mr. Edwards visited our project site on June 22, 2001 and conducted a survey of the island and surrounding area. A report of his findings was submitted to the Ohio Historic Preservation Office on June 29, 2001.

In summary, site 33-ER-436 is located on upland property south of our project (the exact location of site is shown on an aerial photograph contained in Mr. Edwards' report, but not included herein in order to preserve the integrity and security of the site). His survey of the island and environs yielded no specific artifacts, only a few pieces of broken flint. No artifacts other than the bannerstone have been found at site 33-ER-436, although Mr. Edwards has surveyed the site on several occasions. He concluded that our project does not adversely impact site 33-ER-436 or any other archaeological site. He believes that the construction of our project may help protect site 33-ER-436 from destruction by the rapidly receding south shore of Sandusky Bay.

Floodplain. In the early stages of our project, we discussed our plans with the local floodplain administrator for Erie County, Ohio. Because the project was being undertaken pursuant to a Corps of Engineers Nationwide permit in an open-water situation and because no development was involved in the project, no local permit was deemed necessary. However, following receipt of your letter we contacted Mr. Alex MacNichol, Director of the Erie County Planning Commission to discuss any authorizations that may be required by virtue of our project being located within the 100-year floodplain of Sandusky Bay. If any authorization is required we will of course take the necessary actions to comply with specific development standards and/or permits.

Water Withdrawal Facility. Pursuant to your inquiry, on June 14, 2001 we submitted a WATER WITHDRAWAL FACILITIES REGISTRATION PROGRAM form to Mr. Allan Luczyk, ODNR Division of Water for our Sandusky Bay water irrigation system.

#### Policy 27 - Fisheries Management

This policy calls for fisheries of the State of Ohio to be maintained and improved. Our proposed project will accomplish these two objectives in East Sandusky Bay. Recent studies show that Lake Erie coastal wetlands function as important fish habitat by exporting large quantities of fish, first to avian, piscine, and mammalian food chains through predation, and second to the lake as young-of-the-year sport and forage fish (Jude and Pappas 1992 *Fish Utilization of Great Lakes Coastal Wetlands*. Journal of Great Lakes Research 18(4):651-672). This research implied (1) that a wetland must be connected with the lake to promote and enhance efficient fish utilization of the high productivity of marshes, (2) that additional resilience is provided to species which spawn in wetlands since they can produce two cohorts (one in wetlands and one in the lake), and (3) that circulation initiated by fluctuating water levels is important in sustaining habitat diversity and productivity.

Your comments imply that our proposal to create a deep water habitat will be "without the presence of submersed aquatic vegetation." Figure 6 of our application clearly shows our intent to foster the establishment of submersed aquatic vegetation beds along the sides of the channel. No such beds occupied the bay bottom prior to the construction of the hydrologic channel.

Concern has also been expressed that coastal marshes such as those of East Sandusky Bay serve only as habitats for low-quality or undesirable fish species. However, the research Johnson (1989 *Lake Erie Wetlands: Fisheries Considerations*, in K. A. Krieger, ed., *Lake Erie Estuarine Systems: Issues, Resources, Status, and Management*, NOAA, Estuarine Program Office, Washington, DC, p. 257-274) shows that a diverse group of 46 species utilize Lake Erie coastal marshes, 33 of which are abundant or common—including: bigmouth buffalo (*Ictiobus cyprinellus*), quillback carpsucker (*Carpionodes cyprinus*), shorthead redhorse (*Moxostoma macrolepidotum*), white sucker (*Catostomus commersoni*), crappie (*Pomoxis* spp.), bluegill sunfish (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), pumpkinseed (*Lepomis gibbosus*), rock bass (*Ambloplites rupestris*), gizzard shad (*Dorosoma cepedianum*), carp (*Cyprinus carpio*), emerald shiner (*Notropis atherinoides*), spottail shiner (*Notropis hudsonius*), grass pickerel (*Esox americanus*), black bullhead (*Ameiurus melas*), yellow bullhead (*Ameiurus natalis*), brown bullhead (*Ameiurus nebulosus*), channel catfish (*Ictalurus punctatus*), white perch (*Morone*

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*americana*), white bass (*Morone chrysops*), yellow perch (*Perca flavescens*), and freshwater drum (*Aplodinotus grunniens*).

Our proposed project is consistent with OCMP's policy to maintain and improve Lake Erie fisheries in several ways. Firstly, it will create additional coastal marshes and will enhance water circulation to them. Secondly, it will provide a deep-water refugia for wetland fish species that would normally be stranded during low water level events when East Sandusky Bay is dewatered or frozen when the bay freezes to the bottom in winter. Thirdly, it will provide a direct conduit for fish to move between the lake and coastal marshes.

#### Policy 29 – Wildlife Management

Our proposed project is consistent with this OCMP policy by providing benefits to all wildlife, including nongame and endangered species. Your comments appear to be centered around waterfowl species and the notion that our intent is to create only waterfowl habitat. In our application we specify "avifauna habitat on a series of islands" and "deep water (~5 feet) fish and aquatic vegetation habitat in the restored hydrologic channel." Your points are well taken concerning waterfowl, particularly the Canada goose problem (a species for which breeding colonies were introduced to Ohio by ODNR, Division of Wildlife). We have observed numerous Canada goose nests on the barrier beach of Sheldon Marsh State Nature Preserve and the NASA breakwall, and we do not want to replicate your problem with this species. By specifying "avifauna habitat" our intention is to create a diverse habitat of aquatic plant zones on the inside slope of the islands, upland shrubs and trees on the crest, and beach flora on bay side. In this way we will be attracting a diverse community of birds to the islands and minimize unwanted species such as herring and ring-billed gulls and the Canada goose. We have already observed bald eagles (*Haliaeetus leucocephalus*), tundra swans (*Cygnus columbianus*), mallards (*Anas platyrhynchos*), great egrets (*Ardea albus*), and great blue herons (*Ardea herodias*) utilizing the island and hydrologic channel. Figure 12 of the application illustrates our concept of how the islands will appear once we have established native vegetation. As a comprehensive plant nursery, Barnes Nursery, Inc. has the labor, equipment, plant stock, and access to appropriate technical resources to convert this concept into reality.

In developing our highly-praised composting operation, we worked with the U.S. Department of Agriculture (USDA), National Wildlife Research Center, Animal Damage Control Center (located at the NASA facility in Erie County, Ohio) to successfully minimize the aggregation of unwanted bird species. Plans are now being formulated to conduct research on our islands to insure that a similar result is obtained.

The USDA center has recommended that we request a permit for nest removal and egg destruction for unwanted bird species on the islands, particularly herring gull (*Larus argentatus*), ring-billed gull (*Larus delawarensis*), double-crested cormorant, (*Phalacrocorax auritus*), and Canada goose (*Branta canadensis*). This permit and control program would involve weekly monitoring (April-June) by USDA biologists to insure that the proper control measures are taken on the target species. With the approval of ODNR this program will prevent these unwanted bird species from establishing nesting colonies on the islands. Barnes Nursery is prepared to undertake this program in conjunction with USDA.

As a final note, we would like to advise you of our observations that relate to wildlife management for mammalian populations. The island we created north of the hydrologic channel appears to be a preferred habitat for mink (*Mustela vison*). Numerous mink dens have been found near the crest of the island. Here, the recently disturbed soil is easily burrowed into by these mustelids. Tracts of the white-tailed deer (*Odocoileus virginianus*) are also common on the island.

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Thank you for this opportunity to respond to your concerns. We firmly believe that we have demonstrated that our proposed project is consistent with Ohio's Coastal Management Policies and that Barnes Nursery, Inc. and Sheldon Marsh State Nature Preserve can coexist in East Sandusky Bay and be mutually beneficial to each other. Please contact me if you have any questions or require additional information.

Sincerely,



Robert W. Barnes, President  
Barnes Nursery, Inc.

cc: Michael G. Montone, U.S. Army Corps of Engineers  
Laura A. Fay, Ohio EPA  
David Kaiser, NOAA, Office of Coastal Resource Management  
Kenneth C. Lammers, U.S. Fish and Wildlife Service  
Kevin M. Pierard, U.S. EPA  
David Snyder, Ohio Historic Preservation Office  
✓ Steven D. Bell, Ulmer & Berne LLP



